



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

B U L L E T I N
OF THE
TORREY BOTANICAL CLUB.

Vol VI. New York, January, 1875. [No 1.

§ 1. Geographical Distribution of the Ferns of North America,

BY JOHN H. REDFIELD.

For many reasons, writers upon the Flora of North America have found it convenient and useful to limit their province to that part of the continent lying north of Mexico, excluding also the West Indian Islands. In considering the distribution of the Ferns of North America a similar limitation will be followed, which will exclude a large number of tropical forms that can be better studied in connexion with South American or Caribbean geography.

As Ferns are for the most part very dependent upon shade and moisture, their distribution over the continent will be largely determined by the rain-fall of the different portions; and the same conditions which locate the forest regions, will show us where we may expect to find the largest number of species and the greatest development in number and luxuriance of individuals. And as many species live only in the crevices of rocks, or root only in rock-loving mosses, they find in the rugged cliffs of mountain sides all the necessary conditions.

So, as we might expect, the eastern portion of the continent—traversed from N. E. to S. W. by the Appalachian range of mountains which receive and condense the moisture of the winds from the Gulf of Mexico and the Atlantic—furnishes the greatest number of species. Near the Gulf, the moisture of the atmosphere is accompanied by sufficient heat to permit the establishment of many species belonging to the Caribbean province. These soon disappear as we go northward, and as we proceed into Canada and the British possessions, many of the Alleghanian forms die out, and are succeeded by more hardy and cold-enduring species. A few of these continue into high arctic latitudes. Passing now westward beyond the Alleghanian slopes, into the flat, treeless prairies of the Mississippi valley, and still farther, into the arid plains which extend to the foot of the Rocky Mountains, we have a vast region, in which the species gradually diminish in number, and finally almost entirely disappear. Even in the Rocky Mountains we find many of the needed conditions wanting. An atmosphere almost devoid of moisture through much of the year, and so free from cloud as to give burning effect to the direct rays of the sun, limits the fern growth to deep rock clefts and to the valleys of snow-fed streams. A few Boreal and Siberian forms have crept downwards from the north, meeting some of the drought-resisting species which have made their way from Mexico.

Beyond the Rocky Mountains, we enter a widespread desert,

utterly incompatible with fern life, though the island-like snow-covered mountain ridges which here and there emerge from the vast expanse of the thirsty plains, occasionally give shelter to a few hardy species.

But, as we approach the western borders of the continent, the noble coniferous forests of the Cascade Mountains and of the Sierra Nevada again offer inviting conditions, and accordingly we have here a larger proportion of ferns than we have seen since leaving the Appalachian regions. In California, the dry plains which lie between the Sierras and the coast range, again interrupt the fern-life which, however, re-appears upon the coast range. As we go northward along this western coast, the rains become more abundant and the ferns more luxuriant; but as we go towards Southern California, aridity again prevails, restricting the number of species and individuals, and modifying their types. Abundant as is the fern-growth of Alaska, Washington, and Oregon, the number of species is much less than upon the Eastern border of the continent. A few species are peculiar, while the remainder are Asiatic forms which seem to have made their way across the Straits or over the Aleutian Isles even as far south as California, there meeting a few types which have their homes in the Andes.

The number of species which inhabit North America as here defined, is about 125. They may be arranged in six geographical divisions, viz: 1. Cosmopolitan; 2. Boreal; 3. Appalachian; 4. Pacific; 5. New Mexico or Central; 6. Tropical. In enumerating the species we italicize those which are also found in the old world.

I. COSMOPOLITAN: widely distributed over the globe, in both temperate and tropical regions.

Pteris aquilina, L. *Asplenium Trichomanes*, L.

The first of these, thriving in sandy barrens, occurs abundantly in both the old and new world and in the islands, from Lapland in the north to New Zealand and Tasmania in the south. In North America it extends from Labrador and Alaska southward to the isthmus, avoiding only the arid and alkaline plains of our western interior. The other species of this group thrives only in the crevices of shaded rocks, and this condition only, seems to limit its distribution. Throughout the globe it is represented almost as universally as the *Pteris*. There are a few others of our species which are so widespread as almost to claim a place in this division, but which it will be more convenient to consider in the other groups.

II. BOREAL: inhabiting (with a few exceptions) the northern portion of the United States, extending through Canada and British America, some species even reaching Labrador, Greenland and Alaska, and nearly all represented also in the northern portions of the old world.

Phegopteris polypodioides, Fée.
 " *Dryopteris*, (L.) Fée.
 " *alpestris*, (Sw.) Mett.
Struthiopteris Germanica, Willd.

Cryptogramme crispa (L.) R. Br.
Cheilanthes argentea, (Gm.) Kunze.
Cystopteris fragilis, (L.) Bernh.
 " *montana*, (Sw.) Link.

Aspidium Lonchitis, (L.) Sw.
 " *aculeatum*, (L.) Sw.
 " *filix-mas*, (L.) Sw.
 " *fragrans*, (L.) Sw.
 " *spinulosum*, Sw.
Scolopendrium vulgare, Sm.
Asplenium viride, Huds.
 " *septentrionale*, L.
Pellaea gracilis, (Mx.) Hk.
Lomaria Spicant, (L.) Desf.

Woodsia hyperborea, (Sw.) R. Br.
 " *glabella*, Hk.
 " *Ivensis*, (L.) R. Br.
 " *Oregana*, D. C. E.
Botrychium Lunaria, (L.) Sw.
 " *matricariaefolium*, A. Br.
 " *lanceolatum*, (Gm.) Angst.
 " *simplex*, Hitchc.
 " *boreale*, Milde.

Of the species here grouped, we note that *Phegopteris alpestris* has only been observed in North America upon the western coast—coming down as far as California, according to Mr. Baker—and upon the coast of Greenland. *Aspidium filix-mas*, so abundant in the old world, is very restricted upon this continent. It is occasionally found in Canada and near Lake Superior, and occurs rarely in the Rocky Mountains. *Aspidium aculeatum*—so widespread in some of its forms—is local upon our continent, and has not been seen below about 42 degrees. *Scolopendrium*, so abundant in Great Britain, is still more restricted here, and seems confined to a few rocky glens which open into the ancient basin of the great lakes. *Asplenium septentrionale*, widely distributed in the mountains and colder portions of Europe and Asia, has on our continent been seen only in the Rocky Mountains, where it reaches as far south as latitude 32 degrees. *Asplenium viride* does not penetrate the United States, nor is *Woodsia hyperborea* represented with us, unless *W. glabella* be viewed as a variety of it. *Woodsia Oregana* might perhaps be ranked with the Pacific or Rocky Mountain species, but as it has been noticed as far eastward as Lake Superior, it may claim place with the boreal species, though restricted to the new world, so far as known. *Cystopteris montana*, a high northern species of the old world, has been seen in Alaska, also far north in the Rocky Mountains, and on the north of Lake Superior, and in Labrador; while *Cystopteris fragilis* is so widespread on the globe, as almost to deserve a place in our first division, and were it not for its northern proclivities might be called an Appalachian species. *Pellaea gracilis* would be an exclusively American form, but for the fact that it occurs in the Himalaya Mountains, where several other of our American species also appear. *Lomaria Spicant*, common in the northern regions of the old world, appears only on our western border. *Botrychium Lunaria*, frequent throughout northern Europe and not rare in British America, barely enters our own boundaries, but the other *Botrychia* of this group have nearly all been occasionally found within our limits, and are perhaps more abundant than is supposed, their small size and isolated habit enabling them to elude detection. *Cheilanthes argentea* is a Siberian species which reaches the Aleutian islands, and perhaps Alaska, and so must be included in our list.

III. APPALACHIAN: extending throughout the mountain and hilly regions of the States east of the Mississippi, often to the coast, and northward into Canada, and in a few instances also inhabiting the old world.

Polypodium vulgare, L.
Phegopteris hexagonoptera, (Mx.) Fee,
Oenoclea sensibilis, L.,

Aspidium Goldieanum, Hk.
 " *marginale*, Sw.
 " *acrostichoides*, Sw.,

<i>Cheilanthes vestita</i> , Willd.	<i>Cystopteris bulbifera</i> , (L.) Bernh.
“ <i>tomentosa</i> , Link.	<i>Woodsia obtusa</i> , (Willd.) Torr.
<i>Pellaea atropurpurea</i> , (L.) Link.	<i>Lygodium palmatum</i> , L.
<i>Adiantum pedatum</i> , L.	<i>Osmunda regalis</i> , L.
<i>Camptosorus rhizophyllus</i> , (L.) Link.	“ <i>Claytoniana</i> , L.
<i>Asplenium filix-femina</i> , L.	“ <i>cinnamomea</i> , L.
“ <i>thelypteroides</i> , Mx.	<i>Botrychium Virginicum</i> , (L.) Sw.
“ <i>angustifolium</i> , Mx.	“ <i>ternatum</i> , Sw.
“ <i>ebeneum</i> , Ait.	<i>Ophioglossum vulgatum</i> , L.
“ <i>ruta-muraria</i> , L.	
“ <i>pinnatifidum</i> , Nutt.	
“ <i>montanum</i> , Willd.	
“ <i>Bradleyi</i> , D. C. Eaton.	<i>Asplenium marinum</i> , L.
<i>Dicksonia punctilobula</i> , (Mx.) Knz.	<i>Woodwardia Virginica</i> , (L.) Sm.
<i>Aspidium Thelypteris</i> , (L.) Sw.	“ <i>areolata</i> , (L.) Moore.
“ <i>Noveboracense</i> , (L.) Sw.	<i>Schizaea pusilla</i> , Pursh.
“ <i>cristatum</i> , (L.) Sw.	

Of the species in this division we remark that *Onoclea sensibilis*, though absent from Europe and most of Asia, appears in Manchuria and Japan. I am not aware that it now occurs in the Western portion of our own continent, but it is a very interesting fact that it has been discovered in a fossil state in the eocene tertiary on the eastern border of Montana. *Cheilanthes vestita* is hardly found north of 41 degrees extending southwesterly along the mountainous region to about 34 degrees. *C. tomentosa* seems to prevail along the western slope of the mountains, and reappears in the mountains of Arkansas and in the Rocky mountains. *Pellaea atropurpurea* stretches to the northwest even to Slave Lake and southwest to the Ozark Mountains, and occurs sparingly in the Rocky Mountains. Our lovely *Adiantum pedatum* is wanting in Europe, but appears in the Himalayas, in Manchuria and Japan, again in Alaska, thence along our western coast as far as California. *Camptosorus rhizophyllus* is limited to this district, but an allied species without auricles, occurs rarely in Siberia. *Asplenium filix-femina* is almost a cosmopolite, but its fellow in the section *Athyrium*, (*A. thelypteroides*), occurs elsewhere only in Asia. *Asplenium ebeneum* is rather tropical in its relations, and extends into tropical America as far as Peru, and appears in the old world only in South Africa. Yet with us it extends north to about 45 degrees. *Asplenium montanum* is appropriately named, and is strictly Appalachian. It has been observed as far north as Ulster Co., N. Y., extending thence southwesterly to Alabama. *Asplenium pinnatifidum* is rare and local, and has been reported, so far as we know, only from Pennsylvania, North Carolina, Southern Illinois, Missouri, and Arkansas. It has been erroneously considered by some as a variety of *Camptosorus rhizophyllus*, but not only do the generic distinctions hold which Hooker indicated; but its habit is entirely different. Instead of running freely over the surface of rocks, rooting in the moss which covers them, it grows deep in the retreating crevices of precipitous cliffs, rooting itself most tenaciously to the rock, and is rarely or never proliferous. *Asplenium Bradleyi* has as yet been seen only in East Tennessee and Kentucky (See Vol. IV. p. 11 et infra § 3.) *Aspidium Thelypteris* is widespread in the northern hemisphere, and less so in the southern, but its very near relative *A. Noveboracense* is strictly Appalachian. So also are the rest of the *Aspidia* of this division, except *A. cristatum*, which

also appears in Europe. *Lygodium* is for the most part a tropical genus, and most of its species are widespread in warm regions. Our own beautiful species, however, is strictly confined to this division, and occurs but rarely in it, usually in wet, sandy alluvium. Of the three *Osmundæ*, *O. regalis* is almost cosmopolitan, *O. cinnamomea* extends from far north into the tropical regions of South America, and though wanting in Europe, it reappears in Eastern Asia, while *O. Claytoniana* is another species common only to the Appalachian and the Himalayan region. All three are wanting west of the Rocky Mountains. Both of the *Botrychia* of this group are occasionally found in the northern hemisphere of the old world.

The last four species of this group are rather maritime than Appalachian. *Asplenium marinum* is strictly a littoral species, but it is somewhat doubtful whether it is entitled to a place in our Catalogue. It is said to have been collected upon the coast of Newfoundland by Kendal more than thirty years ago, but later collectors have not confirmed it. *Woodwardia areolata* is limited to the marshes of the seaboard States, from Cape Cod southward. *Woodwardia Virginica* has about the same range, but also appears in the regions bordering on the St. Lawrence and the great lakes. Our little *Schizæa* is known only in the cedar swamps of New Jersey, at three or four points over a limit of about thirty miles, although it is said to have been collected in Newfoundland many years ago. Perhaps thorough search in appropriate localities may yet prove its range wider than we know.

IV. PACIFIC: extending along the western border of the continent at points from Alaska to California, in a few cases appearing also in the Rocky mountain region.

<i>Polypodium falcatum</i> , Kellogg.	<i>Pellaea andromedæfolia</i> , (Klf.) Fée.
“ <i>intermedium</i> , Hk., & Arn.	“ <i>Bridgesii</i> , Hk.
“ <i>Californicum</i> , Klf.	“ <i>densa</i> , (Brack.) Hk.
“ <i>Scouleri</i> , Hk., & Arn.	“ <i>ornithopus</i> , Hk.
<i>Gymnogramme triangularis</i> , Klf.	<i>Aspidium munitum</i> , Klf.
<i>Notholaena Newberryi</i> , Eaton.	“ <i>Californicum</i> , Eaton.
<i>Cheilanthes Californica</i> , (Nutt.) Mett.	“ <i>argutum</i> , Klf.
“ <i>gracillima</i> , Eaton.	<i>Woodsia scopulina</i> , Eaton.
<i>Pellaea Breweri</i> , Eaton.	

One or two additional species occur in California, which will be more appropriately considered in the next group. *Gymnogramme triangularis* extends from Vancouver's Island to Southern California and re-appears in Ecuador, South America. *Notholaena Newberryi* is only known at present in Southern California (See BULLETIN, Vol. IV., p. 12.) *Cheilanthes gracillima* has been noted from latitude 44 degrees to 35 degrees. Mrs. Lyell must be wrong in ascribing it to Missouri. *Woodsia scopulina* has been seen from latitude 49 degrees to Columbia River, and appears also in the Rocky Mountains as far south as latitude 39 degrees. We as yet know too little of the range of most of these species to assign a precise limit.

V. NEW MEXICAN: inhabiting the central mountain regions of New Mexico and Colorado, many of the species extending thence

into Mexico and some even to South America, and a few of them also occurring in California.

Gymnogramme pedata, (Sw.) Klf.	Cheilanthes lanuginosa, Nutt.
Notholaena sinuata, (Sw.) Klf.	“ Wrightii, Hk.
“ ferruginea, (Willd.) Hk.	“ microphylla, Sw.
“ candida, M. & G.	Pellaea pulchella, (M. & G.) Fée.
“ cretacea, Liebm.	“ flexuosa, (Klf.) Link.
“ dealbata, (Pursh.) Knz.	“ Wrightiana, Hk.
“ Fendleri, Knz.	Adiantum Chilense, Klf.
Cheilanthes aspera, Hk.	Woodwardia radicans, (L.) Sw.
“ Fendleri, Hk.	Aspidium juglandifolium, Knz.
“ Lindheimeri, Hk.	Aneimia Mexicana, Klotzsch.
“ Eatonii, Baker.	

The prevalence of the drought-resisting genera *Notholaena*, *Cheilanthes* and *Pellaea* in this list will be at once noticed. The precise range of many of these we have yet to learn. *Gymnogramme pedata*, *Notholaena ferruginea*, *N. candida*, *N. cretacea*, *Cheilanthes microphylla*, are all known to extend into Mexico and Central America. *Adiantum Chilense* and *Woodwardia radicans* also occur in California, but their relations are rather with this group, and the latter species is the only one of the group which also appears in the old world.

VI. TROPICAL: inhabiting the border of the Gulf of Mexico, most of the species extending into the West Indies and Tropical America:

Acrostichum aureum, L.	Asplenium dentatum, L.
Vittaria lineata, (L.) Sw.	“ myriophyllum, Presl.
Polypodium Plumula, Kunze.	Aspidium patens, Sw.
“ incanum, L.	“ Ludovicianum, Knz.
“ aureum, L.	“ unitum, (L.) Mett.
“ Phyllitidis, L.	Nephrolepis exaltata, (Sw.) Schott.
Cheilanthes Alabamensis, Knz.	Trichomanes Petersii, Gray.
Pteris Cretica, L.	“ radicans, Sw.
“ longifolia, L.	Aneimia adiantifolia, (L.) Sw.
Adiantum Capillus-Veneris, L.	Ophioglossum bulbosum, Mx.
Bolbitis serrulatum, Mx.	“ nudicaule, L. fil.

Of the above, we note that *Trichomanes Petersii* is quite local, having been seen only in Alabama and Florida. *Cheilanthes Alabamensis* reaches through Texas into New Mexico. *Polypodium incanum* extends farther north than any other in the group—reaching Virginia, on the sea board, and extending up the Mississippi Valley into Illinois, but avoiding the colder mountainous region between. *Adiantum Capillus Veneris* reaches N. Carolina on the east of the mountains and Missouri on the west.* This species is almost cosmopolitan and reaches high latitudes in the old world, but with us is limited as above. The two species of *Pteris* of this group also extend around the globe except in high latitudes.

Of the 125 species here enumerated, 69, or about 55 per cent., are found in the new world only, and of these 69, about 53, or over 42 per cent. of the whole, are restricted to the limits we have defined, except that a few of them extend more or less into Mexico.

We have then, 72 species left, which we share with other portions of the world—some of which are represented in more than one other region. A brief glance at the numerical relationship of these is all that we have space for.

We have 40 species in common with Europe, of which 4 are not found elsewhere.

* It also reappears in Utah and Arizona.

We have 30 species in common with the Himalaya, or northern India, of which 2 are not found elsewhere.

We have in common with northern or eastern Asia 30 species, of which two are not found elsewhere. If we make a similar comparison with the Himalayan region and the north and east of Asia united, we have 46 species in common! of which 5 are exclusive. If we add Europe to this comparison, we have 52 species in common, of which 26 are exclusive. We have also 29 species which occur in the West Indies, 26 which occur in Africa or southern Asia, 36 which inhabit South America, and 19 which occur in Polynesia. The preponderance of Asiatic forms in our fern flora will at once be perceived, and opens an interesting field of inquiry. Those wishing to enter upon it are referred to Dr. Gray's "Observations on the relation of the Japanese Flora to that of North America and of other parts of the northern Temperate Zone," in 6th vol. of *Memoirs of Am. Acad. Arts and Sci.*, 2d series, also in *Silliman's Journal*, Sept., 1859. And in this connection the student will find the elaborate and excellent tables in Mrs. Lyell's "Geographical Hand Book of Ferns" of great service. Seldom has been brought together such a mass of botanico-geographical facts, so well systematized, and so convenient for use.

§ 2. **Hamilton College.**—The Catalogue of Hamilton College for 1874-'5 contains a feature that is rather novel, but certainly very desirable. In its (regular) mention of "The College Grounds," after a short statement of the design of the Curators of the College Grounds, with some historical matters—a part of which design is "to obtain specimens of every tree and shrub supposed to be hardy in the climate of Central New York—a resumé of the experience of the Curators is given in the shape of; (1) a list of the trees which have thus far proved tender in that climate, comprising nine evergreen trees and four deciduous; (2) of deciduous trees which have proved hardy and desirable, numbering eighty-seven species; (3) of evergreens which have been found hardy and worthy of the attention of planters, numbering twenty-eight species; (4) a list of hardy shrubs, numbering fifty-three species; (5) of trees and shrubs procured during the past year, and not yet tested, embracing twenty deciduous trees, thirty-seven evergreen trees, and nineteen shrubs.

From my knowledge of the college grounds, I am inclined to think that the list of hardy trees is not quite full. Most of the deciduous trees, and a large portion of the evergreen trees and of the shrubs, are natives. Among the trees and shrubs "not yet tested as to their hardiness," I notice a number of natives, several of them natives of the immediate vicinity of the college, and which are certainly tested as to the climate, whatever may be the effect upon them of cultivation.

The College Campus is situated upon a high hill, at the intersection of the Mohawk and Chenango valleys, overlooking a very large tract of the region whose peculiar botanical richness is shown in Paine's Catalogue; the cities of Utica and Rome lying far within the circle of vision. The hill is swept over by severe winds, however, and is as hard a place for plants as can well be found in the